



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/862,941	05/22/2001	Mark Flood	01AB077	9740

7590 07/05/2007
William R. Walbrun
Rockwell Automation
Allen-Bradley Co., Inc.
1201 South Second Street
Milwaukee, WI 53204

EXAMINER

SHIN, KYUNG H

ART UNIT	PAPER NUMBER
----------	--------------

2143

MAIL DATE	DELIVERY MODE
-----------	---------------

07/05/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

08

Office Action Summary	Application No. 09/862,941	Applicant(s) FLOOD ET AL.	
	Examiner Kyung H. Shin	Art Unit 2143	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 April 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-52 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 3-52 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114 was filed in this application after a decision by the Board of Patent Appeals and Interferences, but before the filing of a Notice of Appeal to the Court of Appeals for the Federal Circuit or the commencement of a civil action. Since this application is eligible for continued examination under 37 CFR 1.114 and the fee set forth in 37 CFR 1.17(e) has been timely paid, the appeal has been withdrawn pursuant to 37 CFR 1.114 and prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 4/18/2007 has been entered.

Response to Amendment

2. This action is responding to application papers dated 4/18/2007. Claims 1, 3-52 are pending. Claim 1 has been amended. Claim 2 has been canceled. Independent claims are 1, 38, 39 and 52.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claim 1 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was

not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicant has amended claim 1 with the limitation, "*the time synchronization apparatus is configurable to operate as **both** a synchronization master and a synchronization slave*". There is no disclosure within the specification or original claims for this limitation. There is disclosure for an apparatus to act as **either** a master **or** a slave. But, there is no disclosure for an apparatus to act as **both** a master and a slave **at the same time** as the claim limitation states.

Appropriate action is required. If applicant feels there is disclosure for this claim limitation, please indicate the required citation for confirmation.

Response to Arguments

5. Applicant's arguments, filed 4-18-07, with respect to the rejection(s) of claim(s) 1-53 under **Voth** (US Patent No. 6,199,169), **Esker** (US Patent No. 6,236,277) and **Yamanaka** (US Patent No. 4,807,259) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of **Yamanaka** (4,807,259), **Voth** (6,199,169), **Ramussen** (6,449,732) and **Kuribayashi** (6,775,246).

5.1 The examiner has considered the applicant's remarks concerning systems for time synchronization of control operations in a control system. Synchronization networks and devices are provided for transferring synchronization information

between controllers to be synchronized in a distributed or localized control system. (See Abstract)

Claim Rejections 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. **Claims 1, 3-7, 13-28, 30-34, 38-46, 48-52, are rejected under 35 U.S.C. 103(a)** as being unpatentable over **Yamanaka et al.** (US Patent No. **4,807,259**) in view of **Voth** (US Patent No. **6,199,169**: System and method for synchronizing time across a computer cluster, Filed Dec. 15, 1998).

Regarding Claim 1, Yamanaka discloses a time synchronization apparatus for synchronizing operation of a first controller with that of a second controller in a control system, the synchronization apparatus comprising:

- a processor interface for interfacing the synchronization apparatus with a host processor, the time synchronization apparatus is configurable to operate as both a synchronization master and a synchronization slave; (see Figure 3A; Figure 3B; col. 1, lines 15-22; col. 2, lines 29-37; Figure 3A; col. 5, lines 5-9: configurable to operate as a master; Figure 3B; col. 5, lines 12-18: configurable to operate as a slave)

- a timing system with a clock that maintains an indication of time according to information received from one of the network and the host processor. (see Figure 3A; Figure 3B; col. 4, lines 6-14; col. 6, lines 41-63)

Yamanaka discloses a low bandwidth modem circuit for network connections in the network receipt of synchronization information and data. This type of network affords limited communications bandwidth and a limited number of possible network configurations and topologies.

However, Voth discloses wherein:

- a transmitter adapted to transmit synchronization information and data to a network in the control system; (see Voth col. 2, lines 57-60)
- a receiver adapted to receive synchronization information and data from the network; (see Voth col. 2, lines 60-61)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability to network communications in a variety of configurations. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30: "*... Based on the preceding discussion, it is not hard to appreciate that a need exists for time synchronization systems that are suitable for use in networks where the ethernet simplification does not apply. ...*"; col. 2, lines 39-43: "*... Currently available time*

synchronization systems may also require the network to process large numbers of synchronization messages. A large number of synchronization messages steal network bandwidth from other computing tasks. ... ")

Regarding Claims 3, 20, Voth discloses the time synchronization apparatus of claim 1, 14, being configured to operate as a synchronization master, wherein the transmitter periodically transmits message frames at a fixed period. (see Voth col. 4, lines 43-47)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability to be configured to operate as a synchronization master. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claims 4, 15, Voth discloses the time synchronization apparatus of claim 3, 14, wherein the fixed period is about 50 μ s. (According to Applicant's specification on page 28 at lines 15-16, it states, "...the synchronization component can transmit (broadcast) a frame every 50 μ s or some other fixed time period." see Voth col. 4, lines 43-54; where the reference states that the update period is performed at a regular or periodic fixed time period which can be equal to 50us or some other time period.)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where a fixed period is about 50 μ s. One of

Art Unit: 2143

ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claims 5, 16, Voth discloses the time synchronization apparatus of claim 3, 14, wherein the transmitter transmits a message frame having an LCM indicator at a least common multiple (LCM) interval. (see Voth col. 4, lines 43-54: “...*use a repeating update cycle...Update cycle...includes an initial calculation ... scheduling period...a time adjustment period.*” Applicant’s specification states on page 13 at lines 20-26 that “...*least common multiple (LCM) period, ...can be set to the lowest integer multiple of periodic tasks...*” (i.e. set to 1) Thus, LCM is tied to reference’s periodic update cycle.)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability to transmit a message frame having an LCM indicator. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claims 6, 17, Voth discloses the time synchronization apparatus of claim 5, 16, wherein the LCM interval is 600ms. (see Voth col. 4, lines 43-54: “...*use a repeating update cycle...Update cycle...includes an initial calculation...scheduling period...a time adjustment period.*” Applicant’s specification status on page 13 at lines 20-26 that

Art Unit: 2143

"...600ms is exemplary... other LCM periods fall within the scope of the present invention..." Thus, LCM is equal to periodic update cycle.)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where the LCM interval is 600ms. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claims 7, 30, Voth discloses the time synchronization apparatus of claim 3, 14, being configured as a synchronization master, wherein the transmitter transmits message frames having multiplexed data and direct data. (see Voth col. 3, lines 1-9)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability to be configured as a synchronization master. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claim 13, Voth discloses the time synchronization apparatus of claim 7, wherein the timing system is adjustable according to information received from the host processor. (see Voth col. 2, lines 51-54)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where the timing system is adjustable. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claim 14, Voth discloses the time synchronization apparatus of claim 1, being configured as a synchronization slave, wherein the receiver receives message frames at a fixed period, and wherein the timing system is adjusted according to the fixed period. (see Voth col. 4, lines 43-47)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability to be configured as a synchronization slave. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claim 18, Voth discloses the time synchronization apparatus of claim 16, wherein the timing system is adjusted according to the LCM indicator. (see Voth col. 4, lines 47-44)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where the timing system is adjusted. One of

Art Unit: 2143

ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claim 19, Voth discloses the time synchronization apparatus of claim 16, wherein the receiver interrupts the host processor according to the LCM indicator. (see Voth col. 4, lines 43-47)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where the receiver interrupts the host processor. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claim 21, Voth discloses the time synchronization apparatus of claim 20, wherein the message frames received and transmitted by the receiver and transmitter, respectively, comprise multiplexed data and direct data. (see Voth col. 5, lines 18-25)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where the message frames received and transmitted comprise multiplexed data and direct data. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the

Art Unit: 2143

capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claims 22, 43, Voth discloses the time synchronization apparatus of claim 21, 39, wherein the data field comprises 6 32-bit words, and wherein the amount of multiplexed data and the amount of direct data in each message frame is configurable. (see Voth col. 5, lines 50-59; col. 6, lines 10-14: *"Different implementations of the present invention may use difference sizes for an, or all, of these components."*, where reference states that different sizes and values (i.e. amounts of data: 32 bit words) can be used for the data contained within message frames and therefore is configured by implementation.)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where the data field comprises 6 32-bit words. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claim 23, Voth discloses the time synchronization apparatus of claim 22, wherein each message frame comprises a direct data portion and a multiplexed data portion, wherein the direct data comprises the direct data portion of a single frame, and

Art Unit: 2143

wherein the multiplexed data comprises the multiplexed data portions of a plurality of frames. (see Voth col. 5, lines 18-25)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where each message frame comprises a direct data portion and a multiplexed data portion. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claim 24, Voth discloses the time synchronization apparatus of claim 23, wherein the multiplexed data portion comprises configuration information indicative of the amount of multiplexed data and the amount of direct data in each message frame. (see Voth col. 5, lines 26-29; col. 5, lines 50-59)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where the multiplexed data portion comprises configuration information. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claims 25, 26, Voth discloses the time synchronization apparatus of claim 24, wherein the receiver presents direct data or multiplexed data from received

Art Unit: 2143

message frames to the host processor at the fixed or a multiple of the fixed period. (see Voth col. 4, line 67 - col. 5, line 5)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where the receiver presents direct data or multiplexed data from received message frames to the host processor. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claim 27, Voth discloses the time synchronization apparatus of claim 14, comprising a multiplier receiving an operand from the receiver, a multiplication value on the host processor, and providing a multiplication result value to at least one of the host processor and the transmitter, wherein the multiplication result value is the product of the multiplication value and the operand. (see Voth col. 5, lines 18-20)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability comprising a multiplier receiving an operand from the receiver. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claims 28, 32, Voth discloses the time synchronization apparatus of claim

Art Unit: 2143

27, 30, wherein the direct data received in the message frame comprises the operand.
(see Voth col. 5, lines 18-25)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where the direct data received in the message frame comprises the operand. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies.
(see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claim 31, Voth discloses the time synchronization apparatus of claim 30, wherein at least a portion of the direct data in the message frames transmitted by the transmitter is provided to the transmitter by the receiver, wherein the direct data from a received message frame is passed through to the transmitter. (see Voth col. 6, lines 31-37)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where at least a portion of the direct data in the message frames is provided to the transmitter by the receiver. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claims 33, 34, Voth discloses the time synchronization apparatus of claim

Art Unit: 2143

30, wherein at least a portion of the direct data and multiplexed data in the message frames transmitted by the transmitter is provided to the transmitter by the host processor. (see Voth col. 5, lines 20-25)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where at least a portion of the direct data and multiplexed data in the message frames is provided to the transmitter by the host processor. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claim 38, Yamanaka discloses a synchronization module in a control chassis for synchronizing operation of a first controller in the control chassis with that of a second controller outside the control chassis, comprising:

- a host processor in communication with the first controller via a backplane bus in the control chassis; (see Figure 3A; Figure 3B; col. 1, lines 15-22; col. 2, lines 29-37)
- a synchronization circuit operatively associated with the host processor, the transmitter, the receiver, and the timing system, and configurable by the host processor to operate the module as one of a synchronization master and a synchronization slave. (see Figure 3A; col. 5, lines 5-9: configurable to operate as a master; Figure 3B; col. 5, lines 12-18: configurable to operate as a slave)

Yamanaka discloses a low bandwidth modem circuit for network connections in the network receipt of synchronization information and data. This type of network affords limited communications bandwidth and a limited number of possible network configurations and topologies.

However, Voth discloses wherein:

- a transmitter adapted to transmit synchronization information and data to a network in the control system; (see col. 2, lines 57-60)
- a receiver adapted to receive synchronization information and data from the network; (see Voth col. 2, lines 60-61)
- a timing system with a clock and maintaining an indication of time according to information received from one of the network and the host processor; (see Voth col. 2, lines 51-54)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability to network communications in a variety of configurations. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claim 39, Yamanaka discloses a synchronization circuit for synchronizing

operation of a first controller with that of a second controller in a control system,
comprising:

- a processor interface for interfacing the synchronization circuit with a host processor; (see col. 1, lines 15-22; col. 2, lines 29-37)
- a timing system with a clock and maintaining an indication of time according to information received from one of the network and the host processor, wherein the synchronization circuit is configurable by the host processor to operate as one of a synchronization master and a synchronization slave. (see Figure 3A; col. 5, lines 5-9: configurable to operate as a master; Figure 3B; col. 5, lines 12-18: configurable to operate as a slave)

Yamanaka discloses a low bandwidth modem circuit for network connections in the network receipt of synchronization information and data. This type of network affords limited communications bandwidth and a limited number of possible network configurations and topologies.

However, Voth discloses wherein:

- a transmitter component adapted to transmit synchronization information and data to a network in the control system; (see Voth col. 2, lines 57-60)
- a receiver component adapted to receive synchronization information and data from the network; (see Voth col. 2, lines 60-61) and

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability to network communications

Art Unit: 2143

in a variety of configurations. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claims 40, 41, Voth discloses the system of claim 39, wherein the transmitter component periodically transmits message frames comprising direct data, and wherein the direct data is obtained from at least one of the receiver, the host processor, and the multiplier. (see Voth col. 5, lines 18-25)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where the transmitter component periodically transmits message frames. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claim 42, Voth discloses the system of claim 39, wherein the transmitter component periodically transmits message frames comprising multiplexed data, and wherein the multiplexed data is obtained from the host processor. (see Voth col. 4, lines 43-47)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where the transmitter component periodically

Art Unit: 2143

transmits message frames comprising multiplexed data. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claim 44, Voth discloses the system of claim 39, wherein the receiver component periodically receives message frames comprising direct data, multiplexed data, and status information from the network, and wherein the synchronization circuit provides at least one of received direct data, received multiplexed data and received status information from the receiver component to the host processor. (see Voth col. 6, lines 31-37)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where the receiver component periodically receives message frames comprising direct data, multiplexed data, and status information. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claim 45, Voth discloses the system of claim 44, further comprising a multiplier operating on the received direct data, and wherein the synchronization circuit

Art Unit: 2143

provides a multiplier result value from the multiplier to the host processor. (see Voth col. 5, lines 18-20)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability comprising a multiplier operating on the received direct data. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claim 46, Voth discloses the system of claim 45, wherein the synchronization circuit provides a multiplication value to the multiplier from the host processor. (see Voth col. 5, lines 18-20)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where the synchronization circuit provides a multiplication value to the multiplier. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claim 48, Voth discloses the system of claim 39, wherein the transmitter component periodically transmits message frames comprising direct data, multiplexed data, and configuration information, and wherein the synchronization circuit provides at

Art Unit: 2143

least one of the direct data, multiplexed data, and configuration information to the transmitter component from the host processor. (see Voth col. 5, lines 18-25)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where the transmitter component periodically transmits message frames comprising direct data, multiplexed data, and configuration information. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claim 49, Voth discloses the system of claim 39, wherein the transmitter component periodically transmits message frames having synchronization information, wherein the synchronization information is obtained from the timing system, and wherein the timing system is adjusted according to at least one of synchronization information received from the network and synchronization information from the host processor. (see Voth col. 4, lines 43-47; col. 2, lines 51-54)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where the transmitter component periodically transmits message frames having synchronization information. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claim 50, Voth discloses the system of claim 39, wherein the synchronization circuit interrupts the host processor according to receipt of an LCM indicator by the receiver. (see Voth col. 4, lines 43-47)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where the synchronization circuit interrupts the host processor. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claim 51, Voth discloses the system of claim 39, wherein the synchronization circuit interrupts the host processor periodically for presentation of at least one of direct data and multiplexed data from the receiver to the host processor. (see Voth col. 4, lines 43-47)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where the synchronization circuit interrupts the host processor periodically. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claim 52, Voth discloses a synchronization system for synchronizing a first controller with a second controller in a control system, comprising:

- means for interfacing the synchronization circuit with a host processor; (see Figure 3A; Figure 3B; col. 1, lines 15-22; col. 2, lines 29-37)
- means for maintaining an indication of time according to information received from one of the network and the host processor, wherein the synchronization circuit is configurable by the host processor to operate as one of a synchronization master and a synchronization slave. (see Figure 3A; col. 5, lines 5-9: configurable to operate as a master; Figure 3B; col. 5, lines 12-18: configurable to operate as a slave)

Yamanaka discloses a low bandwidth modem circuit for network connections in the network receipt of synchronization information and data. This type of network affords limited communications bandwidth and a limited number of possible network configurations and topologies.

However, Voth discloses wherein:

- means for transmitting synchronization information and data to a network in the control system; (see Voth col. 2, lines 57-60)
- means for receiving synchronization information and data from the network; (see Voth col. 2, lines 60-61)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability to network communications in

Art Unit: 2143

a variety of configurations. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claims 53, Voth discloses the time synchronization apparatus of claim 1, the synchronization apparatus exists in a different synchronization time zone from that of the host processor. (see Voth col. 4, lines 17-19: distributed internetworking environment such as the Internet operates across time zones)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where the synchronization apparatus exists in a different synchronization time zone. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

8. **Claims 8, 9, 10, 11, 12** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Yamanaka-Voth** and further in view of **Ramussen et al.** (US Patent No. 6,449,732: Method and apparatus for processing control using a multiple redundant processor control system).

Art Unit: 2143

Regarding Claim 8, Voth discloses a header with flag bytes, a control byte and a data

field and a bitmask used in error detection for data within the message frames. Voth

does not disclose specifically the CRC technique in error detection procedures.

However, Rasmussen discloses the time synchronization apparatus of claim 7, wherein

the same comprises three flag bytes, a control byte, a data field comprising the

multiplexed data and the direct data, and two CRC bytes. (see Rasmussen col. 14, lines

1-4: *"Calculates and check the received CRCs..."* ; col. 14, lines 16-19: *"Calculates and send the transmit CRCs..."*)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka

as taught by Voth to enable the capability for a header with flag bytes, a control byte

and a data field and a bitmask used in error detection for data within the message

frames, and to modify Yamanaka-Voth with the error detection capabilities as taught by

Rasmussen. One of ordinary skill in the art would have been motivated to employ the

teachings of Voth in order to enable the capability to network communications over a

wide range of network configurations and topologies (see Voth col. 2, lines 27-30; col. 2,

lines 39-43), and to employ the invention of Rasmussen in order to enhance the

processing of time synchronization information with an extension in error detection

capabilities (see Rasmussen col. 5, lines 24-27: *"...hardware loop-back fault detection,*

CRC checking....").

Regarding Claims 9, 12, Voth discloses the time synchronization apparatus of claim 8,

wherein the data field comprises 6 32-bit words, and wherein the amount of multiplexed

data and the amount of direct data in each message frame is configurable. (see Voth col. 5, lines 50-59; col. 6, lines 10-14: *"Different implementations of the present invention may use difference sizes for an, or all, of these components."*, where reference states that different sizes and values (i.e. amounts of data: 32 bit words) can be used for the data contained within message frames and therefore is configured by implementation.)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where the data field comprises 6 32-bit words. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claim 10, Voth discloses the time synchronization apparatus of claim 9, wherein each message frame comprises a direct data portion and a multiplexed data portion, wherein the direct data comprises the direct data portion of a single frame, and wherein the multiplexed data comprises the multiplexed data portions of a plurality of frames. (see Voth col. 5, lines 18-25)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where each message frame comprises a direct data portion and a multiplexed data portion. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to

Art Unit: 2143

network communications over a wide range of network configurations and topologies.

(see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claim 11, Voth discloses the time synchronization apparatus of claim 10, wherein the multiplexed data portion comprises configuration information indicative of the amount of multiplexed data and the amount of direct data in each message frame.

(see Voth col. 5, lines 26-32; col. 5, lines 48-59)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where the multiplexed data portion comprises configuration information. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

9. Claims 29, 35, 36, 37, 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Yamanaka-Voth** and further in view of **Kuribayashi et al.** (US Patent No. **6,775,246**: Method of determining master and slaves by communication capability of network nodes).

Voth discloses a time synchronization apparatus with designated master and slave nodes and a timing system with a periodic and continuously updating feature. (see Voth col. 35, lines 45: *"... a distributed system that maintains the synchronization between time clocks ..., one of the nodes...assumes a master role. The remaining*

nodes 102 then function as slaves ...To synchronize time clocks 212, master node 102a and slave nodes 102b-d use a repeating update cycle")

Regarding Claims 29, 47, Voth does not disclose an apparatus to process status information from an upstream device. However, Kuribayashi discloses the time synchronization apparatus of claim 14, 44, wherein the message frame comprises a status component indicative of the status of an upstream device and error counter, wherein the receiver provides the status component to the host processor. (see Kuribayashi col. 2, lines 9-19; col. 8, lines 37-42)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Yamanaka-Voth with an apparatus to process status information from an upstream device as taught by Kuribayashi. One of ordinary skill in the art would be motivated to employ the invention of Kuribayashi in order to extend the processing of time synchronization information to control the operation of additional devices. (see Kuribayashi col. 1, lines 53-57: *"...provide a novel communication control apparatus, which permits the proper and simple setting of transmission/reception nodes...synchronization information in a high-speed network."*)

Regarding Claim 35, Voth does not disclose a procedure to process a status signal from an upstream device in a daisy-chain. However, Kuribayashi discloses the time synchronization apparatus of claim 1, being configured as an intermediate node in a daisy-chain topology, the receiver receiving synchronization information from an

Art Unit: 2143

upstream device in the daisy-chain, and the transmitter transmitting the synchronization information to at least one downstream device in the daisy-chain. (see Kuribayashi col. 2, lines 9-19; col. 8, lines 37-42)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Yamanaka-Voth in order for an apparatus to process status information from an upstream device as taught by Kuribayashi. One of ordinary skill in the art would be motivated to employ the invention of Kuribayashi in order to extend the processing of time synchronization information controlling the operation of networked devices. (see Kuribayashi col. 1, lines 53-57: *"...provide a novel communication control apparatus, which permits the proper and simple setting of transmission/reception nodes ...synchronization information in a high-speed network."*)

Regarding Claim 36, Voth discloses the time synchronization apparatus of claim 35, wherein the receiver receives message frames at a fixed period, and wherein the transmitter transmits message frames at the fixed period comprising direct data and multiplexed data. (see Voth col. 4, lines 47-54)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where the receiver receives message frames at a fixed period. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Regarding Claim 37, Voth discloses the time synchronization apparatus of claim 36, wherein at least a portion of the direct data in the message frames transmitted by the transmitter is provided to the transmitter by the receiver, wherein the direct data from a received message frame is passed through to the transmitter. (see Voth col. 4, lines 47-54)

It would have been obvious to one of ordinary skill in the art to modify Yamanaka as taught by Voth to enable the capability where at least a portion of the direct data in the message frames transmitted by the transmitter is provided to the transmitter and the direct data from a received message frame is passed through to the transmitter. One of ordinary skill in the art would have been motivated to employ the teachings of Voth in order to enable the capability to network communications over a wide range of network configurations and topologies. (see Voth col. 2, lines 27-30; col. 2, lines 39-43)

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kyung H Shin whose telephone number is 703-305-0711. The examiner can normally be reached on 9 am - 7 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David A Wiley can be reached on 703-308-5221. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2143

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kyung H Shin
Patent Examiner
Art Unit 2143



KHS
June 24, 2007